REMARKS

The Applicants hereby submit this Request for Reconsideration in response to the Office Action mailed on 10 October 2006. In the present Request for Reconsideration, no claims have been amended, added, or canceled. Therefore, claims 1-2, 4, 6, 8-16, 18, and 21-30 are pending for further examination.

In the Office Action of 10 October 2006, the Examiner maintained the rejection of claims of the present application under 35 U.S.C. Sect. 103(a) as being unpatentable over U.S. Patent No. 6,315,875 to Sasaki (hereinafter "Sasaki") in view of U.S. Patent Application Publication US 2004/0027730 to Lille (hereinafter "Lille"). In response, the Applicants respectfully submit that all pending claims of the present application are allowable over the prior art of record for at least the following reasons.

For an appropriate 35 U.S.C. Sect. 103(a) rejection, the prior art (alone or in combination) must teach or suggest each and every limitation in the claims. Also, there must be an adequate suggestion or motivation to combine the teachings of the prior art references. In the present case, the prior art fails to teach each and every claim limitation, and there is no adequate suggestion or motivation to combine the teachings of Sasaki and Lille as provided for in the Office Action.

As stated previously, the claims recite that the protective layer utilized in the present invention is a *chemical-mechanical polishing (CMP) protective layer* – in contrast to a protective capping layer of tantalum (e.g. see Sasaki). A capping layer of tantalum does not provide a suitable physical barrier to a CMP pad during a CMP lift-off process. If it did, for example, no protective layer of carbon would ever be needed to protect the read sensor from the CMP pad. To construe the terminology "CMP protective layer" any differently so as to include a capping layer of tantalum, would be to construe the terminology in an unreasonable manner to one ordinarily skilled in the art.

The claims of the present application recite further steps such as:

> performing a reactive ion etching (RIE) to remove end portions of the CMP protective layer in end regions which surround the central region without removing any of the read sensor layers, to thereby leave intact both a central protective portion of the CMP protective layer underneath the first photoresist structure and the read sensor layers;
>
> after performing the RIE and leaving the read sensor layers intact, performing an ion milling of the read sensor layers such that end portions of the read sensor layers are removed in the end regions and a central sensor portion remains underneath the first photoresist structure, to thereby define a stripe height for the read sensor;

In Sasaki, there are no adequate teachings or suggestions to utilize a RIE in the end regions *without removing any of the read sensor layers*. In fact, such a step would run counter to the teachings of Sasaki. Specifically, Sasaki emphasizes a first etching step for etching *some of the layers making up the GMR element*. See e.g. the Abstract of Sasaki. Some of these layers must include at least the top capping layer of tantalum (e.g. see column 11 at line 58 of Sasaki). In contrast, in the present claims it is recited that the RIE fails to etch the read sensor layers.

Earlier, the Examiner made the following argument in attempt to demonstrate the §103 rejection:

> "[t]he motivation for making such a modification would have been to better accomplish the goal disclosed by Sasaki of exploiting the differences between the RIE and the ion milling to ensure that the layers underneath the read sensor layers are not damaged when the read sensor layers are removed. Sasaki teaches that performing only RIE would damage the underlying shield gap layer 4a, whereas removing the read sensor layers by ion milling keeps the shield gap layer from being damaged. (Column 12, Lines 11-62) In other words, using the RIE to remove only the protective layer, as taught by Lille, would further insure that the RIE is unable to damage the shield gap layer, as desired by Sasaki.

The Applicants respectfully disagree with the Examiner's assessment above. One of the goals of Sasaki is to prevent the over-etching of read sensor materials with the ion milling process. See e.g. Sasaki at column 3 at lines 66-67 through column 4 at lines 1-10, stating *the problem of conventional techniques*:

> ...over-etching is required to some extent when the layers 105a, 105b, 105c are etched through ion milling. Consequently, as shown in FIG. 22, the very thin first shield gap film 104a having a thickness of 20 to 40 nm may be damaged or etched and holes may be thus formed in the shield gap film 104a. If the conductive layers 106 are formed, as shown in FIG. 23, while the first shield gap film 104a has holes, a short circuit is created between the bottom shield layer 103 and the conductive layers 106. Such a short circuit results in an increase in noise that affects the GMR element 105.

To help overcome this problem, Sasaki initially uses a RIE process to etch at least some of the read sensor layers of the GMR element and subsequently uses an ion milling process to etch the remaining read sensor layers. In Sasaki, at least some of the read sensor layers etched with the RIE include the free layer of the GMR element (see e.g. 12:14-18: "The first etching is performed to etch some of the layers making up the GMR element 5, that is, a part of the thickness of the layers from the top surface. For example, this etching is performed at least as deep as the free layer 5c"). This way, the time required of the subsequent second etching (i.e. ion milling) is kept short in order to prevent over-etching and damage to the sensor of Sasaki. See e.g. Sasaki at column 12 at lines 48-54:

> The second etching step is performed to etch only some of the layers making up the GMR element 5, instead of etching all of these layers. Therefore, the time required for performing the second etching is short. As a result, very little damage is done to the first shield gap film 4a even through ion milling is performed as the second etching.

This is the solution which Sasaki proposes.

If Sasaki were modified such that only the CMP protective layer which covers the read sensor was removed by RIE – as the Examiner suggested – then the undesirable outcome described in relation to columns 3-4 would be practiced. That is, the second etching step of Sasaki (i.e. the ion milling) would be employed to etch through the entire read sensor and cause undesirable sensor damage. As apparent, Sasaki teaches away from such technique. See e.g. *In re Rudko*, Civ. App. No. 98-1505 (Fed. Cir. May 14, 1999). Thus, there is no associated teaching, or adequate suggestion or motivation to combine the teachings of Lille and Sasaki, as suggested by the Examiner.

The Examiner further asserted that the motivation to combine the teachings to result in the present invention would have been to better accomplish the goal disclosed by Sasaki, to exploit the differences between the RIE and the ion milling to ensure that the layers underneath the read sensors are not damaged when the read sensor layers are removed. Certainly, however, for Sasaki to refrain from applying the RIE to any of its read sensor layers would be to propose techniques which provide the undesirable results of the prior art, according to Sasaki.

Relatedly, the Examiner continues the failing argument found on page 19 of the Office Action that:

> Sasaki teaches that in the first etching step of RIE, *some of the layers making up the GMR element 5* are etched. (Column 12, Lines 14-17) Again, the Examiner notes that Sasaki identifies the protection layer 5g, corresponding to the protective layer recited in the claims of the instant application, *as part of the GMR element. Therefore, when Sasaki says that some of the layers making up the GMR element 5 are etched, this includes the case that only the protection layer is etched.* (Emphasis Supplied)

However, the statement by the Examiner that "this includes the case that only the protection layer is etched" is untrue because Sasaki does not have any CMP protection layer to etch. The Examiner is apparently referring to some CMP protection layer that is being incorporated improperly into Sasaki as if it were there (which it is not). The

protection layer of Sasaki is merely a capping layer. No such CMP protection layer is taught in Sasaki. The claims of the present application clearly recite that the protective layer utilized in the present invention is a *chemical-mechanical polishing (CMP) protective layer* – in contrast to a protective capping layer of tantalum (e.g. see Sasaki). A capping layer of tantalum does not provide a suitable physical barrier to a CMP pad during a CMP lift-off process.

Even assuming that a CMP protective layer were formed over the read sensor of Sasaki, and even assuming that a RIE process were used to etch away only this CMP protective layer to leave the remaining read sensor layers of Sasaki intact, then the result would be that the ion milling process is used to mill away all read sensor layers of Sasaki – which would lead to the undesirable read sensor damage. Again, some of these layers which are etched away in Sasaki must include at least the top capping layer of tantalum (e.g. see column 11 at line 58 of Sasaki). In contrast, in the present claims it is recited that the RIE fails to etch the read sensor layers.

Again, the technique of the present disclosure requires a RIE of a CMP protective layer "without removing any of the read sensor layers" ... "to thereby leave intact ... the read sensor layers." An "ion milling" is performed "after performing the RIE and leaving the read sensor layers intact." The prior art alone or in combination fail to teach or suggest the same.

The Applicants again further note that an invitation to explore alone is insufficient as a suggestion or motivation. See e.g. *Ex parte Obukowicz*, 27 USPQ2d 1063 B.P.A.I. 1992). Also, the motivation to combine requires desirability, not merely trade-offs. See e.g. *Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 53 USPQ2d 1580 (Fed. Cir.).

In the Office Action, the Examiner further argues two reasons regarding why the making of the modification of Sasaki does not defeat the objective of Sasaki. The

Examiner's *first reason* is that "[e]ven if the first step of the etching method were only used to remove the protection layer (which Sasaki calls part of the GMR element 5), the second step of the etching method would take less time than otherwise, still allowing the goal of Sasaki to be attained" (see page 21 of the Office Action). However, the first Examiner's reason is incorrect because, as described above, there is no CMP protective layer in Sasaki; therefore if a CMP protective layer were added then the remaining read sensor layers which would be left intact for ion milling would be all read sensor layers of Sasaki (e.g. including Sasaki's tantalum capping layer), and this would undesirably take the same amount of time (not less time) to be etched.

The Examiner's *second reason* is that "[t]he conventional method taught by Sasaki is still a viable, workable process, which Sasaki simply seeks to improve upon" and that "Sasaki does not teach away from the conventional method, but rather teaches a better way" (see page 21 of the Office Action). However, the Examiner's second reason fails because it assumes too much and creates a new alternative basis for the rejection of claims. For one, the rejection of claims made by the Examiner in the Office Action is not based on alternative teachings of conventional techniques stated in column 3 of Sasaki, but rather in relation to the teachings in columns 11, 12, and 13 of Sasaki. The Examiner even makes admissions that make it clear what the basis of the rejections are: "Sasaki does not expressly teach that the RIE is performed without removing any of the read sensor layers" (see e.g. rejection of claim 1 on page 3 of the Office Action). In addition, the Examiner assumes that the method described in relation to column 3 of Sasaki ("conventional techniques") is the same as the method described in relation to columns 11-13, except for the RIE process. This assumes too much. For example: no part of the stripe height definition is described in relation to column 3 of Sasaki. As apparent, the Examiner cannot mix and match the teachings of Sasaki as desired, which appears to be the case in the Office Action.

If the Examiner is rejecting the claims on the basis of column 3 of Sasaki, the Examiner should articulate the rejection of claims with such specificity and reference to column 3 on pages 1-18 of the Office Action; no such references or specificity has been

made. If the Examiner is relying on any inherency in the teachings of Sasaki in column 3, then the Examiner has failed to articulate any reasons why such limitations are necessarily present in such teachings in column 3 of Sasaki.

Finally, the Applicants continue to maintain that there is no adequate suggestion or motivation to utilize a CMP based lift-off technique in combination with a protective barrier in defining a stripe height (and defining both a stripe height and a trackwidth) of a read sensor. In Lille, the CMP-based liftoff technique is utilized to define a trackwidth (TW) of a read sensor. In fact, the sole purpose of Lille is to define a narrow track width for a read sensor (e.g. see title of Lille: "NARROW TRACK READ SENSOR AND METHOD OF MAKING THE SAME"). Lille is directed to the employment of "lead overlays" (see Lille in FIG. 15 at 1302 and 1304) to narrowly define the read sensor in the trackwidth dimension. Hard bias and lead layers are subsequently deposited in the end regions after defining the trackwidth. As apparent, Lille is directed to use of CMP-based liftoff only with respect to trackwidth (TW). In Sasaki, there is no teaching of utilizing the steps of Lille with any stripe height (SH) definition process. Again, there is no teaching or suggestion to utilize a CMP-based lift-off technique to define the stripe height of a read sensor. The most that might be argued based on the prior art of record is that the CMP-based liftoff technique could be used to define the trackwidth (TW) of the read sensor in Sasaki. However, this is not enough to reject the pending claims of the present application.

With respect to this point, the Applicants note that common knowledge or common sense is not enough to supply the motivation to combine teachings. See e.g. *In re Lee*, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002). Also, the motivation to combine requires desirability, not merely trade-offs. See e.g. *Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 53 USPQ2d 1580 (Fed. Cir.).

Based on the above, the Applicant submit that all pending claims as amended are allowable over the prior art of record and that the present application is now in a condition suitable for allowance.

Thank you. Please feel free to contact the undersigned if it would expedite the prosecution of the present application.

Respectfully Submitted,

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